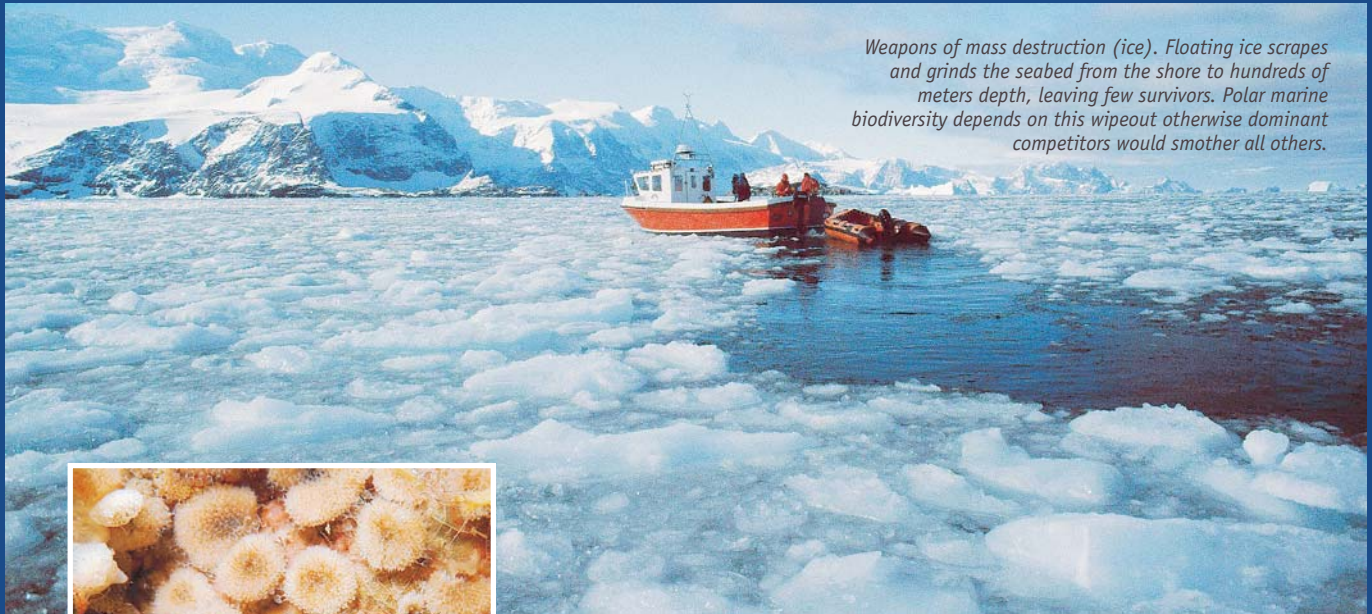


Polar punches and tropical truces



Weapons of mass destruction (ice). Floating ice scrapes and grinds the seabed from the shore to hundreds of meters depth, leaving few survivors. Polar marine biodiversity depends on this wipeout otherwise dominant competitors would smother all others.



Hot competition on cold rocks. Antarctic bryozoans battle for precious space on shallow sea boulders. Beania erecta (species shown) is top of the pecking order; without dislodgement by ice or waves, other competitors have little chance.

Global warming could create monocultures of our polar coastlines, writes David Barnes.

Space, the crucial frontier. Animals need space to find food and mate, but to keep it they must fight – and to lose can mean death. I've been studying animal battles on rocks in shallow seas from poles to tropics. My findings, reported in the latest Proceedings of the Royal Society (Biological Sciences) 1504: 2061-2069, show that nowhere are these fights more ferocious than at extreme latitudes. At the equator, scraps for space end in draws, where both competitors keep some space – and their lives. Not so towards the poles, not only must animals in cooler climates survive the battering of iceberg scour and giant waves built by the furious fifty and screaming sixty winds, but every other rock dweller is out to get them. Pecking orders are common in animal communities from stags to sparrows and enormous elephant seals to diminutive beasts like bryozoans, which I've been studying. The league table of tropical species is full of no-score draws and loops, and top-of-the-league competitors being occasionally beaten by those in the 'relegation zone'. This network system is unpredictable and complex, but helps explain how such a huge range of species can occur side by side in warm tropical seas. The ferociousness of the polar pecking orders mean that the very disturbance (ice and waves), which Arctic and Antarctic animals

must endure, is vital for their long-term survival. Without it the 'Mr Big' at the top of the pecking order would simply grow over everything and polar sea-beds could resemble monoculture farmland. So the scraping and pounding of these coasts regularly returns rocks to bare beginnings – all competitors must start again and the poorest competitors get a head start, as their light structures, which are poor for fighting, are quick to build.

We can use these implications about the way in which biodiversity is generated and maintained in shallow seas to look at how communities have and will react to global change. Coastal boulders are prime real estate for many animals, so there has rarely been love on the rocks between competitors for this most precious of resources. Unusually for organism battles, they can be fossilised, so we can look at how similar fights ended millions of years ago and how they shaped the communities we see today. Perhaps more importantly, in the light of rapid global warming in parts of the Arctic and Antarctica, we can model what will happen if the ice continues to disappear. With less ice to scour the coasts, the annual destruction of coastal communities may be bad news for most of those species and biodiversity, but a for a few 'Mr Bigs' prospects may have never looked better.

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